

R1 = H or one of the following:

R2 = H or one of the following:

R2-10 = H or one of the following: OH, SO₃, phosphate, NH₂NHAc, OCH₃, O-alkyl, CH₃, CH-alkyl, or inorganic-alkyl; O linked to another R2-10 within the same monosaccharide.

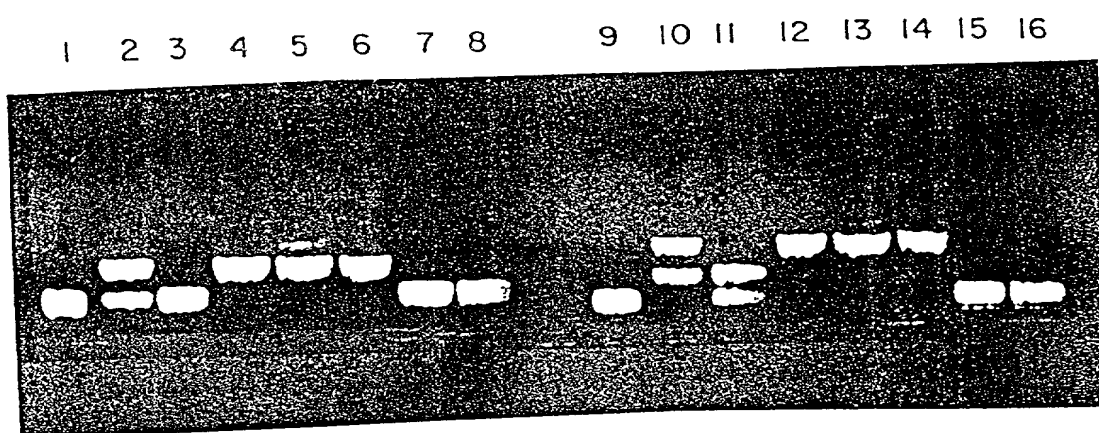
β -O Linked to the 1, 2, 3, 4, or 6 position of the adjacent monosaccharide or a linear or branched polysaccharide.

α -O Linked to the 1, 2, 3, 4, or 6 position of the adjacent monosaccharide or a Linear or branched polysaccharide.

FIG. 1

113 : Gal β 1-3G1cNAc β 1-3Ga1 β 1-4G1c-Co
 /
 Fuca1-4

167 : Gal β 1-3G1cNAc β 1-3Ga1 β 1-4G1c-Co



Substrate 113

- | | | |
|---|---|-----------------------------------|
| 1 | + | no preparation |
| 2 | + | <u>X. holcicola</u> preparation |
| 3 | + | <u>X. badrii</u> preparation |
| 4 | + | <u>X. manihotis</u> preparation |
| 5 | + | <u>X. cyanopsidis</u> preparation |
| 6 | + | <u>X. oryzae</u> preparation |
| 7 | + | <u>X. campestris</u> preparation |
| 8 | + | <u>X. campestris</u> preparation |

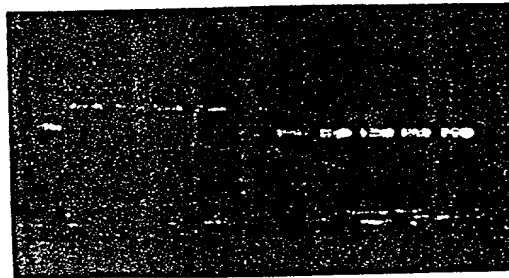
Substrate 157

- | | | |
|----|---|-----------------------------------|
| 9 | + | no preparation |
| 10 | + | <u>X. holcicola</u> preparation |
| 11 | + | <u>X. badrii</u> preparation |
| 12 | + | <u>X. manihotis</u> preparation |
| 13 | + | <u>X. cyanopsidis</u> preparation |
| 14 | + | <u>X. oryzae</u> preparation |
| 15 | + | <u>X. campestris</u> preparation |
| 16 | + | <u>X. campestris</u> preparation |

FIG. 2

109 : \downarrow
 $\text{Ga1}\alpha\text{1-3Ga1}\beta\text{1-3G1cNAc-Co}$

M 1 2 3 4 5 6 7 8 9 10



Substrate 109

Lanes 1-4

1

2

3

4

5-8

9-10

= complete digest

= 1 $\mu\text{l.}$ of $\alpha\text{1-3, 6 Galactosidase}$

= 0.5 $\mu\text{l.}$

= 0.25 $\mu\text{l.}$: concentration of enzyme-4 units/ $\mu\text{l.}$

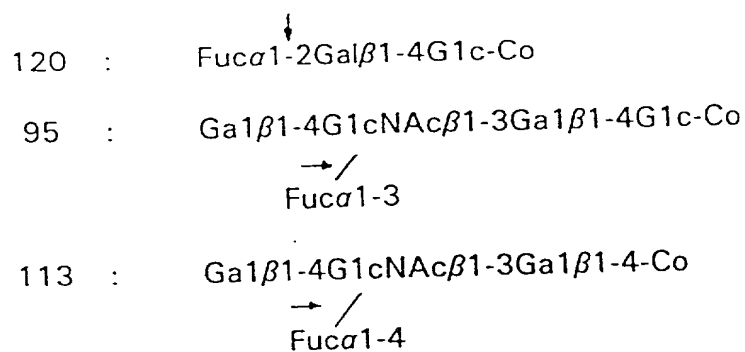
= 0.125 $\mu\text{l.}$

= partial digest

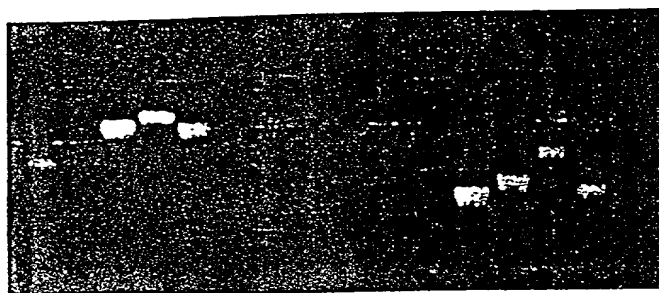
= undigested

FIG. 3

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M 1 2 3 4 5 6 7 8 9 10 11



Substrate 120

- 1 + no enzyme
- 2 + α -Fucosidase II
- 3 + α -Fucosidase I

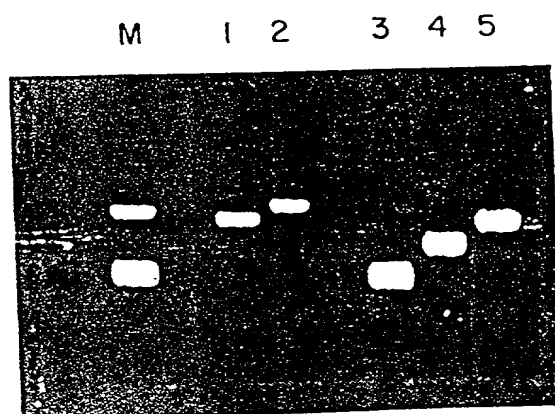
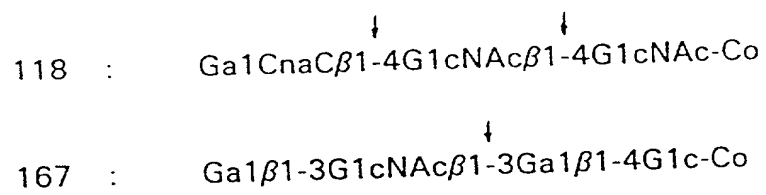
Substrate 95

- 4 no enzyme
- 5 + α -Fucosidase I
- 6 + α -Fucosidase I + β -Galactosidase (bovine testes)
- 7 + α -Fucosidase II

Substrate 113

- 8 no enzyme
- 9 + α -Fucosidase I
- 10 + α -Fucosidase I + β -Galactosidase (bovine testes)
- 11 + α -Fucosidase II

FIG. 4



Substrate 118

1	+	no enzyme
2	+	β -GlcNAcase

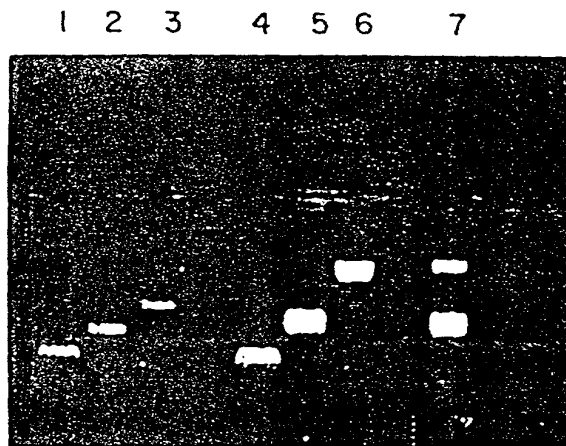
Substrate 167

3	+	no enzyme
4	+	β -Galactosidase
5	+	β -Galactosidase + β -G1cNAcase

FIG.5

200 : $\text{Ga1}\beta\text{1-4G1cNAc}\beta\text{1-2Man}\alpha\text{1-6Man}\beta\text{1-4G1c-Co}$
 (linear)

197 : $\text{Ga1}\beta\text{1-4G1cNAc}\beta\text{1-6 Ga1}\beta\text{1-4G1c-Co}$
 (branched) $\text{Ga1}\beta\text{1-4G1cNAc}\beta\text{1-3}$



Substrate 200

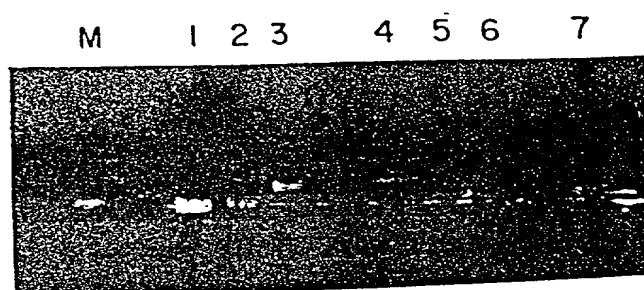
1	+	no enzyme
2	+	β -Galactosidase
3	+	β -Galactosidase + β -GlcNAcase (<u>X. manihotis</u>)

Substrate 197

4	+	no enzyme
5	+	β -Galactosidase
6	+	β -Galactosidase + β -G1cNAcase (<u>X. manihotis</u>)
7	+	Marker (92b,167)

FIG. 6

96 : Ga1NAc β 1-3Ga1 α 1-4Ga1 β 1-4G1c-Co
 205 : Ga1NAc β 1-4Ga1 β 1-4G1c-Co



Substrate 96

1	+	no enzyme
2	+	β -GlcNAcase (<u>X. manihotis</u>)
3	+	β -GlcNAcase (bovine kidney)

Substrate 205

4	+	no enzyme
5	+	β -GlcNAcase (<u>X. manihotis</u>)
6	+	β -GlcNAcase (bovine kidney)
7	+	Marker (92b,167)

FIG. 7

A dark, grainy aerial photograph showing a horizontal line of land or structures, possibly a beach or a breakwater, with some lighter patches indicating buildings or vegetation. The image is very dark and noisy.

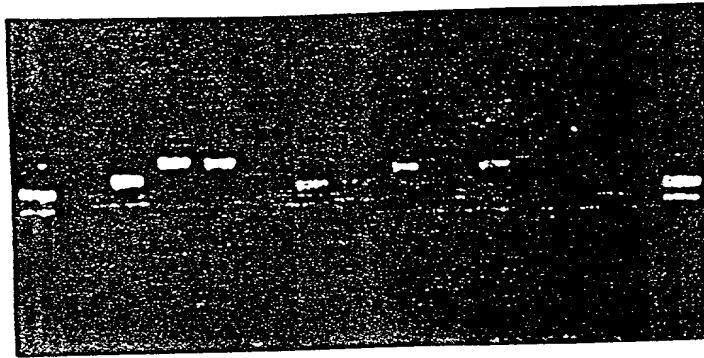
1	+	no enzyme
2	+	β 1-3 >> 4 Galactosidase (<u>X. manihotis</u>) at 1x concentration
3	+	β 1-3, 4>6 Galactosidase (bovine testes) at 1x concentration
4	+	β 1-3, 4 Galactosidase (chicken liver) at 1x concentration

5 + no enzyme
6 + $\beta 1-3 > > 4$ Galactosidase (X. manihotis) at 100x concentration
7 + $\beta 1-3, 4 > 6$ Galactosidase (bovine testes) at 1x concentration
8 + $\beta 1-3, 4$ Galactosidase (chicken liver) at 1x concentration

FIG. 8

109 : $\text{Ga1}\alpha 1\text{-3Ga1}\beta 1\text{-3G1cNAc-Co}$
 193 : $\text{Ga1}\alpha 1\text{-4Ga1}\beta 1\text{-4Gal-Co}$
 181 : $\text{Ga1}\alpha 1\text{-6G1}\alpha 1\text{-2Fru-Co}$

I 2 3 4 5 6 7 8 9 10 M



1 Marker

Substrate 109

2 + no enzyme
 3 + $\alpha 1\text{-3, 6 Galactosidase (X. manihotis)}$
 4 + $\alpha 1\text{-3, 4, 6 Galactosidase (coffee bean)}$

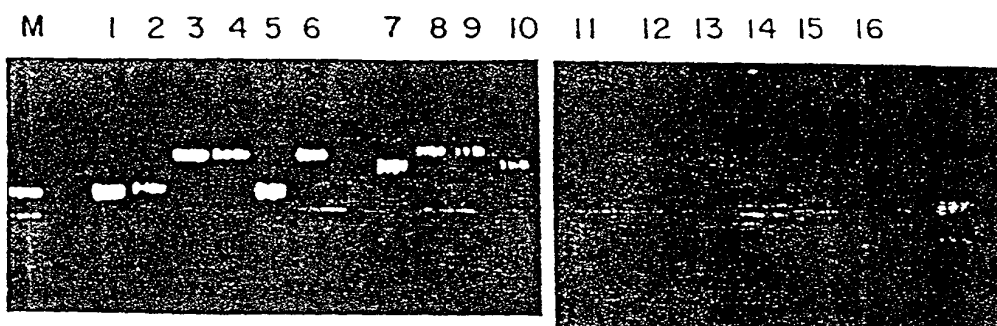
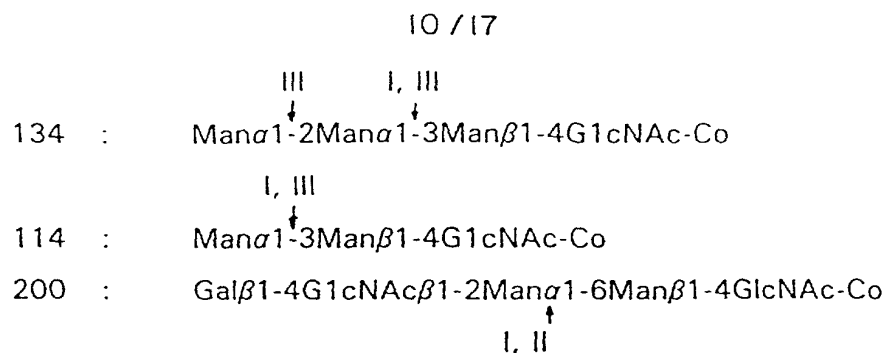
Substrate 193

5 + no enzyme
 6 + $\alpha 1\text{-3, 6 Galactosidase (X. manihotis)}$
 7 + $\alpha 1\text{-3, 4, 6 Galactosidase (coffee bean)}$

Substrate 181

8 + no enzyme
 9 + $\alpha 1\text{-3, 6 Galactosidase (X. manihotis)}$
 10 + $\alpha 1\text{-3, 4, 6 Galactosidase (coffee bean)}$

FIG. 9



Substrate 134

- | | | |
|---|---|---|
| 1 | + | no enzyme |
| 2 | + | α -Mannosidase I (15 units, 20 hrs.) |
| 3 | + | α -Mannosidase III (15 units, 2 hrs.) |
| 4 | + | α -Mannosidase III (15 units, 20 hrs.) |
| 5 | + | α -Mannosidase II (100 units, 20 hrs.) |
| 6 | + | Jack bean α -Mannosidase |

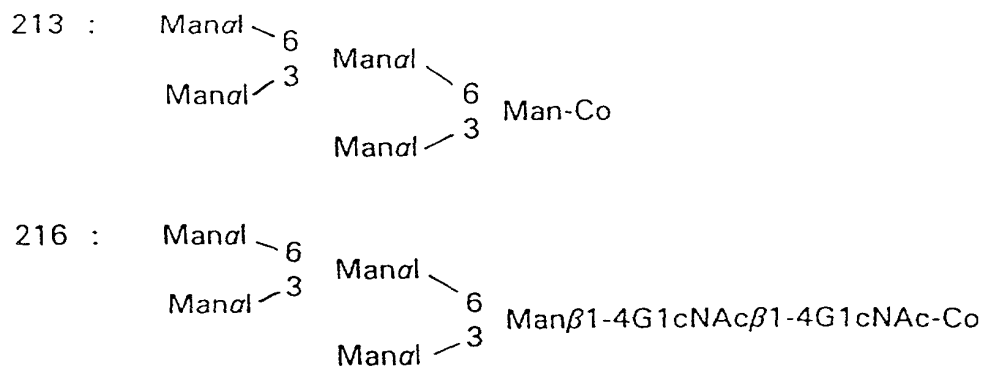
Substrate 114

- | | | |
|----|---|---|
| 7 | + | no enzyme |
| 8 | + | α -Mannosidase I (15 units, 2 hrs.) |
| 9 | + | α -Mannosidase III (15 units, 2 hrs.) |
| 10 | + | α -Mannosidase III (15 units, 2 hrs.) |
| 11 | + | α -Mannosidase II (100 units, 20 hrs.) |

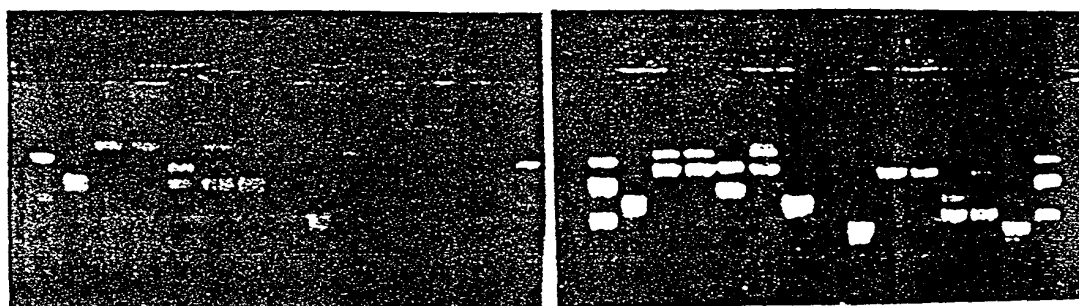
Substrate 200

- | | | |
|----|---|--|
| 12 | + | no enzyme |
| 13 | + | β -Galactosidase (bovine testes ^{OGSI}) |
| 14 | + | β -Galactosidase + β -GlcNAcase |
| 15 | + | β -Galactosidase + β -GlcNAcase + α -Mannosidase I (15 units, 2 hrs.) |
| 16 | + | β -Galactosidase + β -GlcNAcase + α -Mannosidase III (15 units, 2 hrs.) |
| 17 | + | β -Galactosidase + β -GlcNAcase + α -Mannosidase II (15 units, 2 hrs.) |

FIG. 10



M 1 2 3 4 5 6 7 8 9 10 11 12 M M 13 14 15 16 17 18 19 20 21 22 23 24



TWO-HOUR INCUBATION

Substrate 213

- 1 + no enzyme
- 2 + α -Mannosidase I
- 3 + α -Mannosidase I + II
- 4 + α -Mannosidase III
- 5 + α -Mannosidase II + III
- 6 + α -Mannosidase II

Substrate 216

- 7 + no enzyme
- 8 + α -Mannosidase I
- 9 + α -Mannosidase I + II
- 10 + α -Mannosidase III
- 11 + α -Mannosidase II + III
- 12 + α -Mannosidase II

TWENTY-HOUR INCUBATION

Substrate 213

- 13 + no enzyme
- 14 + α -Mannosidase I
- 15 + α -Mannosidase I + II
- 16 + α -Mannosidase III
- 17 + α -Mannosidase II + III
- 18 + α -Mannosidase II

Substrate 216

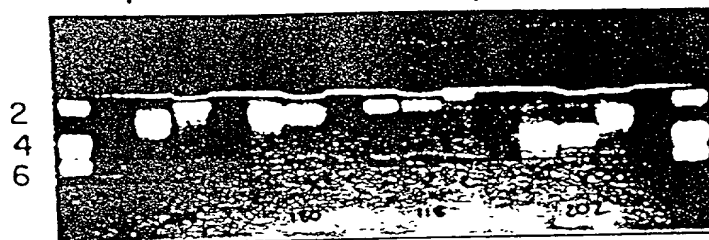
- 19 + no enzyme
- 20 + α -Mannosidase I
- 21 + α -Mannosidase I + II
- 22 + α -Mannosidase III
- 23 + α -Mannosidase II + III
- 24 + α -Mannosidase II

FIG. II

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179 : Glc β 1-4Glc β 1-4Glc-Co
 180 : Glc α 1-4Glc α 1-4Glc-Co
 118 : GlcNAc β 1-4GlcNAc β 1-4GlcNAc-Co
 202 : Gal β 1-4GlcNAc β 1-3Gal β 1-4Glc-Co

M 1 2 3 4 5 6 7 8 9 10
 └ 179 ┐ └ 180 ┐ └ 118 ┐ └ 202 ┐



M Marker

Substrate 179

1 + no enzyme
 2 + β Glucosidase (1 unit)

Substrate 180

3 + no enzyme
 4 + β Glucosidase (5 units)

Substrate 118

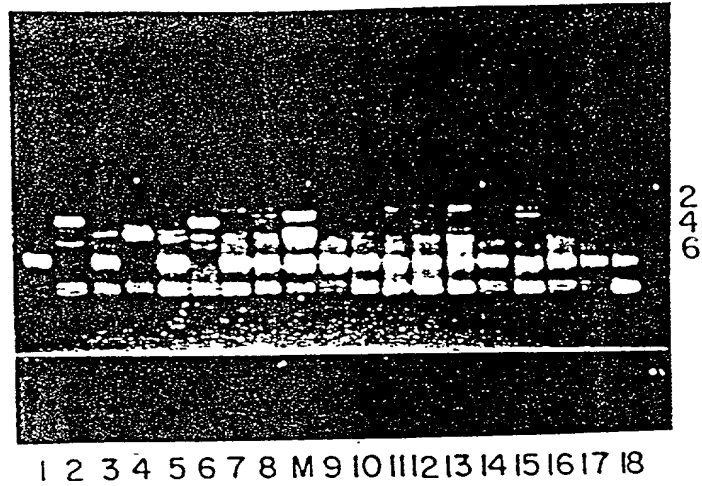
5 + no enzyme
 6 + β Glucosidase (5 unit)
 7 + β glcNAcase

Substrate 202

8 + no enzyme
 9 + β Glucosidase (5 units)
 10 + β Galactosidase

FIG. 12

FOSTFT SEED001



Substrate: Gs 300

Lane Nos.

1. No extract
2. *Xanthomonas holycicola* ATCC # 13461
3. *Xanthomonas badrii* ATCC # 11672
4. *Xanthomonas manihotis* ATCC # 49764
5. *Xanthomonas cyanopsidis* ATCC # 55472
6. *Xanthomonas oryzae* ATCC # 55470
7. *Xanthomonas campestris* ATCC # 55470
8. *Xanthomonas campestris*

M: Markers (92b, 167, 197)

9. No extract
10. *Bacillus globigii* I
11. *Bacillus globigii* II
12. *Bacillus caldolyticus*
13. *Bacillus brevis*
14. *Bacillus stearothermophilus* Strain A
15. *Bacillus stearothermophilus* Strain B
16. *Bacillus aneurinolyticus*
17. *Bacillus sphaericus*
18. *Bacillus stearothermophilus* Strain C

FIG. 13

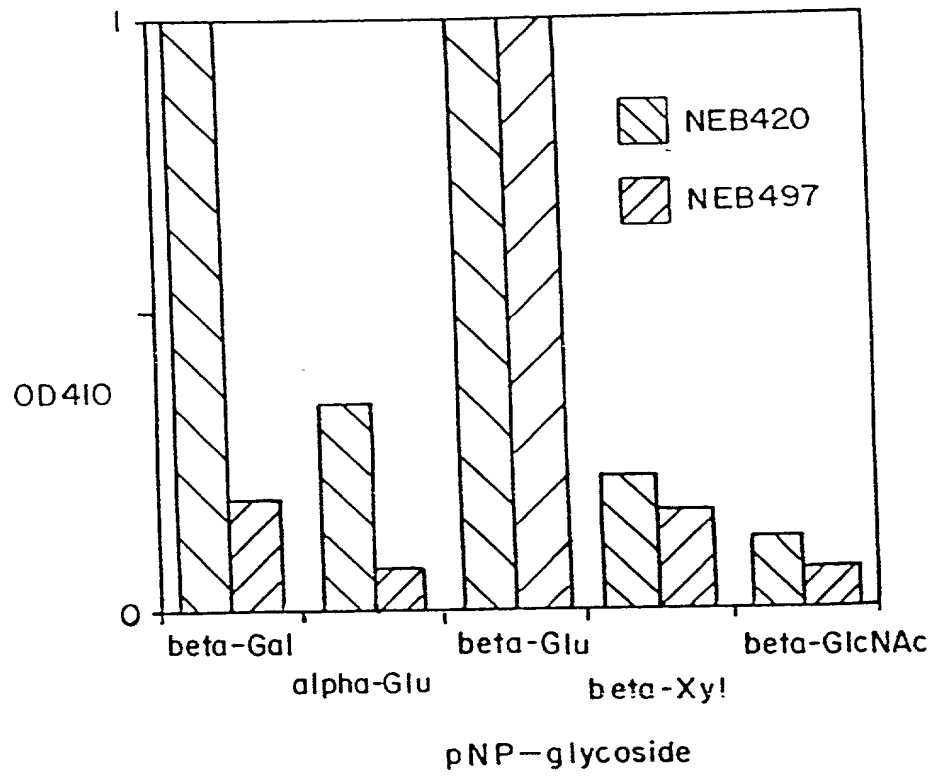


FIG. 14



1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Substrate 202

- | | |
|----------------------------------|---------|
| 1. No extract | |
| 2. <i>Xanthomonas campestris</i> | NEB 420 |
| 3. <i>Xanthomonas campestris</i> | NEB 497 |

Substrate 167

- | | |
|----------------------------------|---------|
| 4. No extract | |
| 5. <i>Xanthomonas campestris</i> | NEB 420 |
| 6. <i>Xanthomonas campestris</i> | NEB 497 |

Substrate 180

- | | |
|----------------------------------|---------|
| 7. No extract | |
| 8. <i>Xanthomonas campestris</i> | NEB 420 |
| 9. <i>Xanthomonas campestris</i> | NEB 497 |

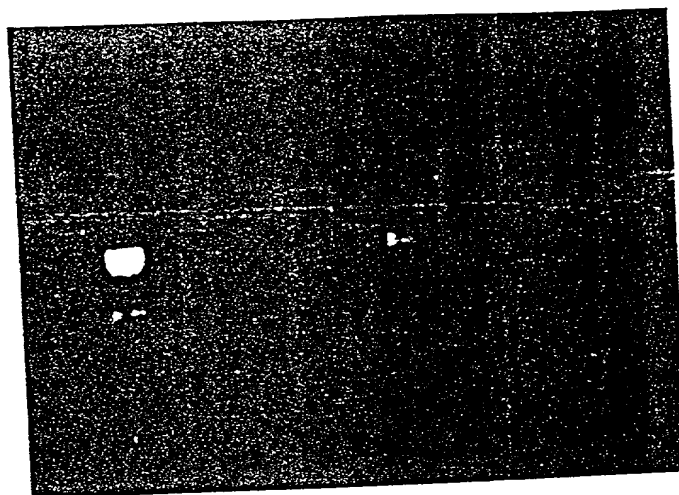
Substrate 179

- | | |
|-----------------------------------|---------|
| 10. No extract | |
| 11. <i>Xanthomonas campestris</i> | NEB 420 |
| 12. <i>Xanthomonas campestris</i> | NEB 497 |

Substrate 233

- | | |
|-----------------------------------|---------|
| 13. No extract | |
| 14. <i>Xanthomonas campestris</i> | NEB 420 |
| 15. <i>Xanthomonas campestris</i> | NEB 497 |

FIG. 15



M: Marker (191, 202)

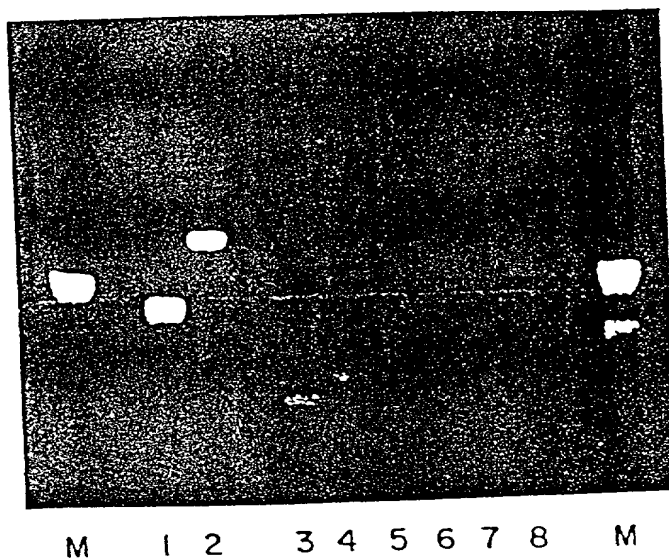
Substrate 300

1. No enzyme
2. 2 units α 1-2, 3 Mannosidase (*Xanthomonas manihotis*)
3. 2 units α 1-2, 3 Mannosidase + 5 units β -Xylosidase (*Xanthomonas holcicola*)
4. 5 units β -Xylosidase (*Xanthomonas holcicola*)

Substrate 264

1. No enzyme
2. 5 units β -Xylosidase (*Xanthomonas holcicola*)

FIG. 16



M: Marker (191, 202)

Substrate 259

1. No enzyme
2. 2.5 units β -Mannosidase

Substrate 300

3. No enzyme
4. 2 units α 1-2, 3 Mannosidase (*Xanthomonas manihotis*)
5. 2 units α 1-2, 3 Mannosidase + 2 units β -Xylosidase (*Xanthomonas holcicola*)
6. 2 units α 1-2, 3 Mannosidase + 2 units β -Xylosidase + 10 units α 1-6 Mannosidase (*Xanthomonas manihotis*)
7. 2 units α 1-2, 3 Mannosidase + 2 units β -Xylosidase + 10 units α 1-6 Mannosidase + 2.5 units β -Mannosidase (*Xanthomonas holcicola*)
8. 2.5 units β -Mannosidase (*Xanthomonas holcicola*)

FIG. 17